A Search for Variation in the Surface Mineralogical Composition of J VI Himalia

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Diverse spectral data exist for Jupiter's moon J VI Himalia. The overall spectral shape suggests that it has the same mineralogical composition as a C-class asteroid, lending credibility to the theory that Himalia was a C-class asteroid that formed in or near the main asteroid belt and was ejected and captured into orbit around Jupiter. Using an algorithm developed earlier, ECAS photometry (Tholen and Zellner, 1984) of Himalia taken on one date only have tested positively for the presence of a 0.7- μm feature attributed to an Fe^{2+} -> Fe^{3+} charge transfer transition in oxidized iron in phyllosilicates. The presence of this feature was confirmed by narrowband spectrophotometry obtained on one date in April, 1995. Narrowband spectrophotometry of Luu (1991) does not cover the full spectral range defined by the 0.7-μm absorption feature, but is in good agreement with the ECAS photometry. However, no 3.0-μm water of hydration absorption feature was observed in IR radiometry (A. S., Rivkin, per. comm.). Correlation between the 0.7-μm feature and the 3.0-μm feature has been demonstrated in spectra of low-albedo asteroids, and suggests that it should be present. A rough rotational period for Himalia of 9.2 - 9.8 hrs is known. Himalia could represent the junction of two different compositional units, produced when an impact fragmented Himalia's parent body. The presence of iron-bearing phyllosilicates on part of Himalia's surface supports the hypothesis that Himalia is a captured C-class asteroid. Rotationally-resolved spectra of Himalia could confirm a variation in composition; we have started a program to collect these data.

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